

Using IPMI and CIM

A Partnership for Powerful Platform Management

Tom Slaight & Arvind Kumar

Server Management Architects
Enterprise Platforms Group
Intel Corporation

June 16-19 San Jose, California

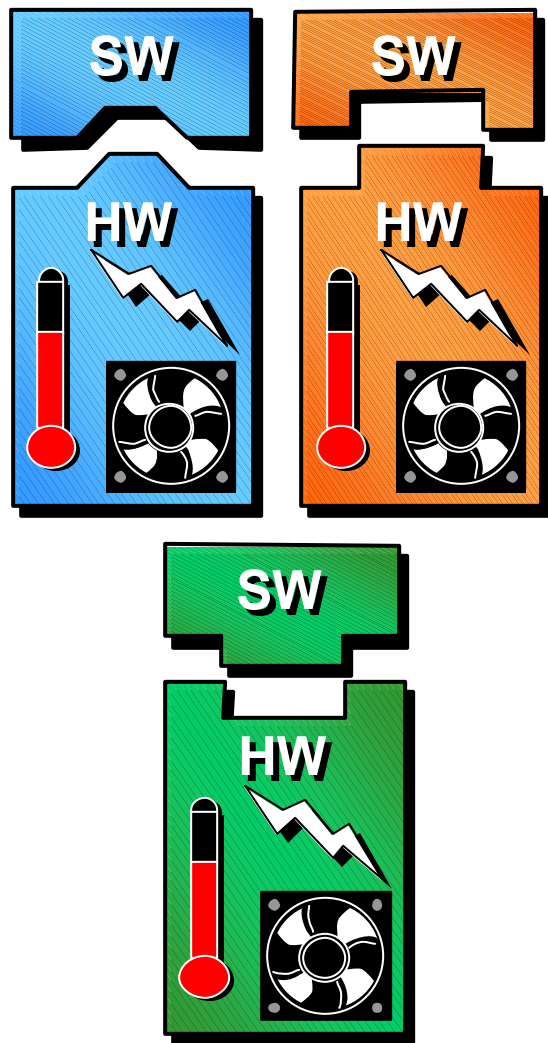


Agenda

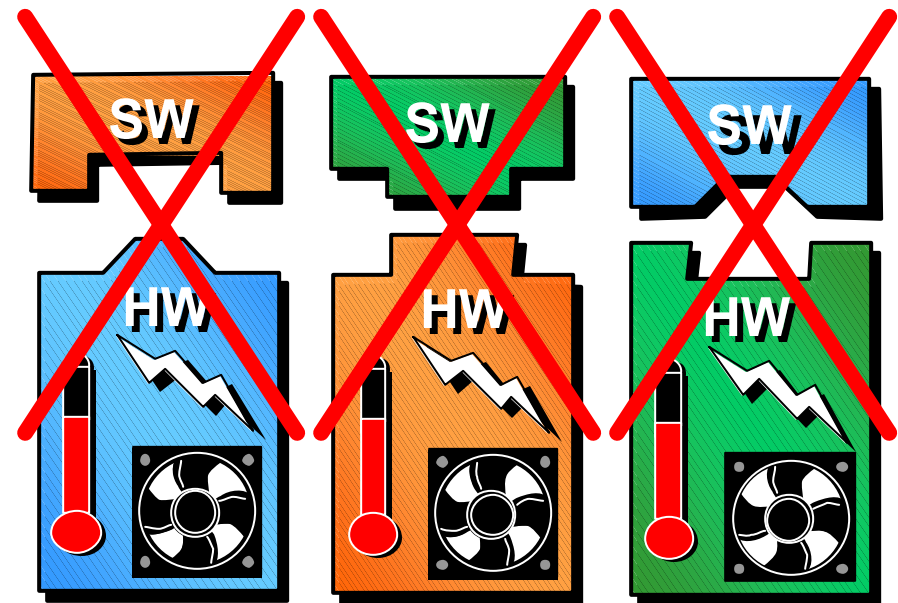
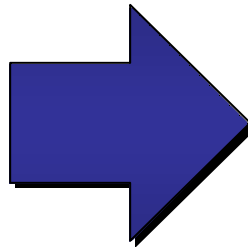
- Introduction to IPMI
- New system directions for IPMI
- IPMI future directions
- IPMI mapping to CIM
- Usage Scenarios



The Instrumentation Challenge



Today's solution stacks work -



But not across platforms

IPMI

Intelligent Platform Management Interface

- Defines a standardized, abstracted, message-based interface to intelligent platform management hardware
- Defines standardized records for describing platform management devices and their characteristics

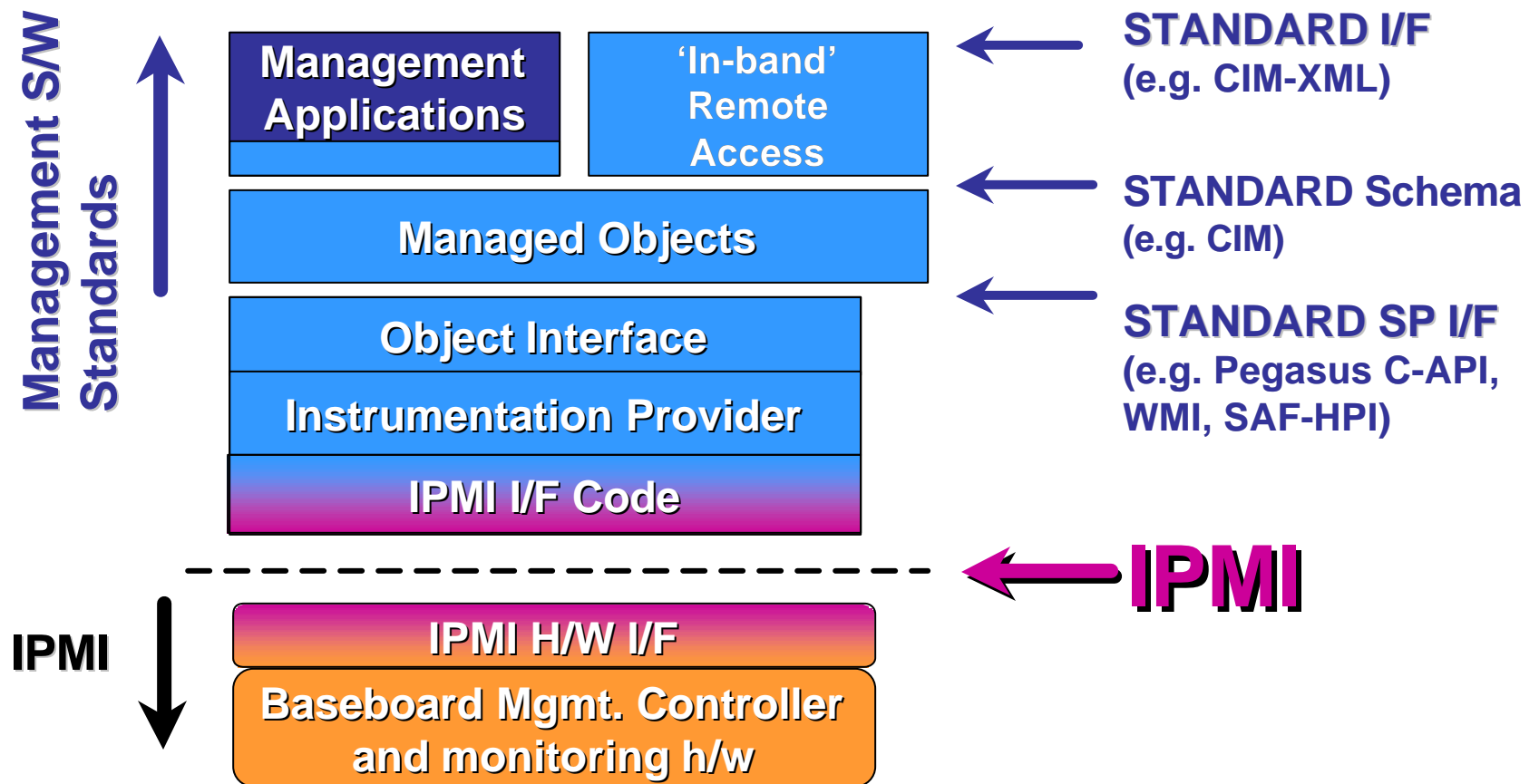
Promoters:



Adopters: 148 and growing

<http://developer.intel.com/design/servers/ipmi>

Where it fits...

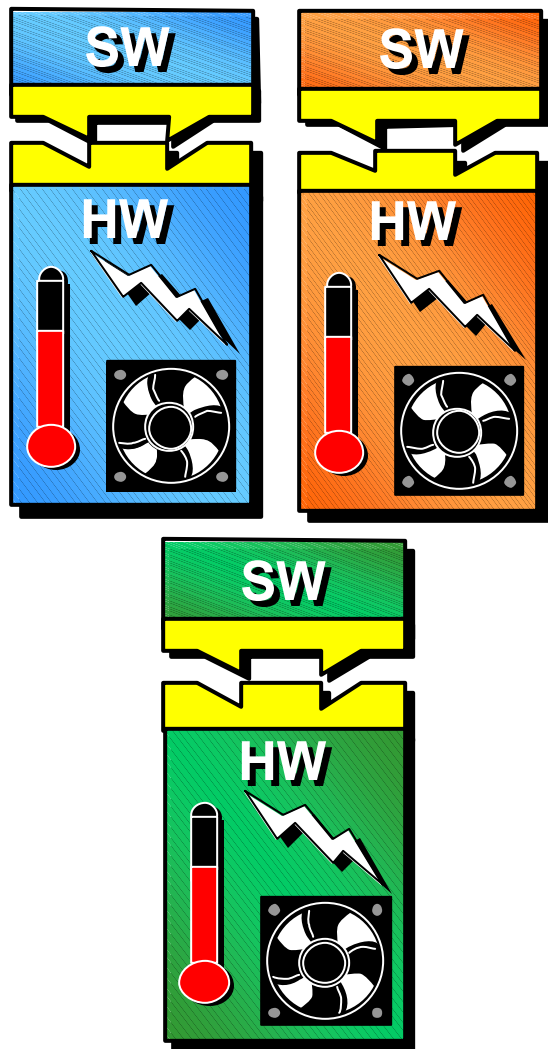


Complements existing management

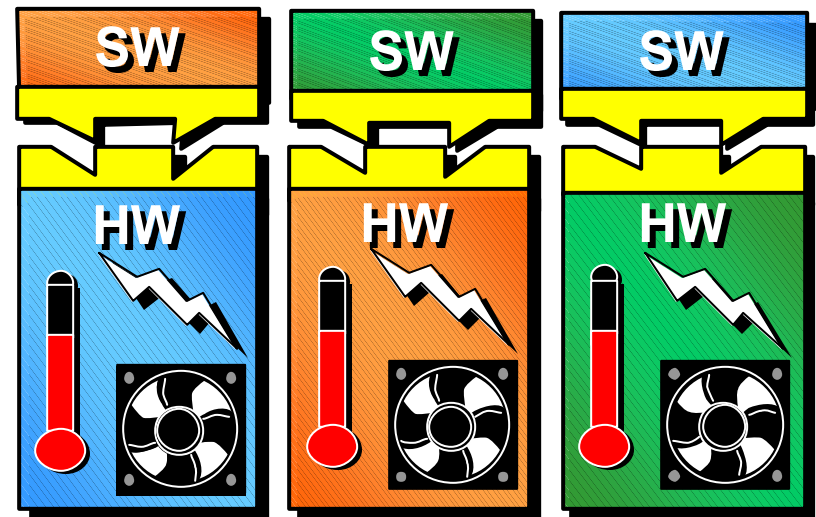
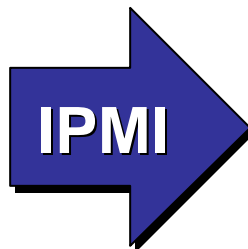
standards

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The IPMI Solution

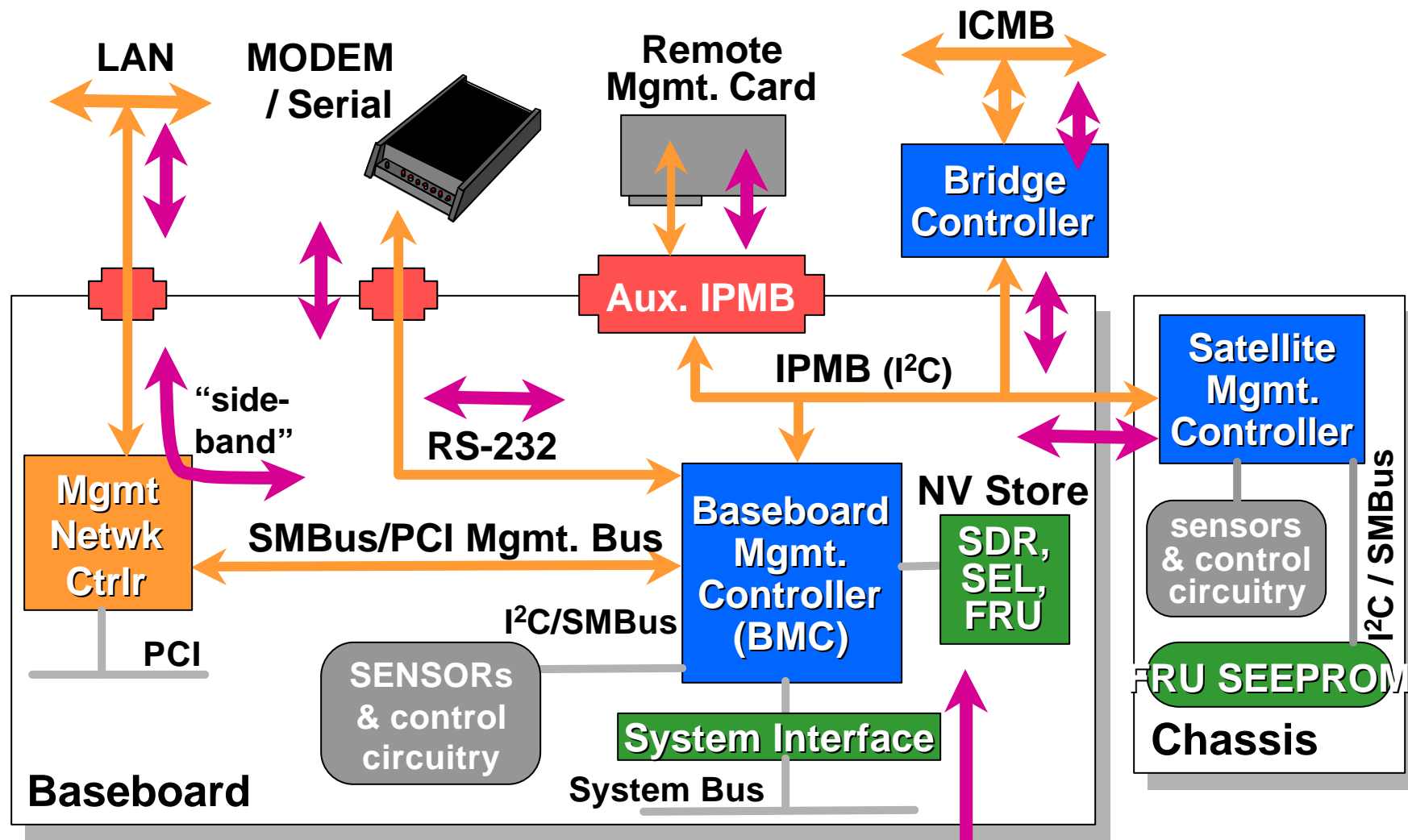


**Common Hardware Interfaces
and Abstraction -**



**Enable Cross-platform
Management Software**

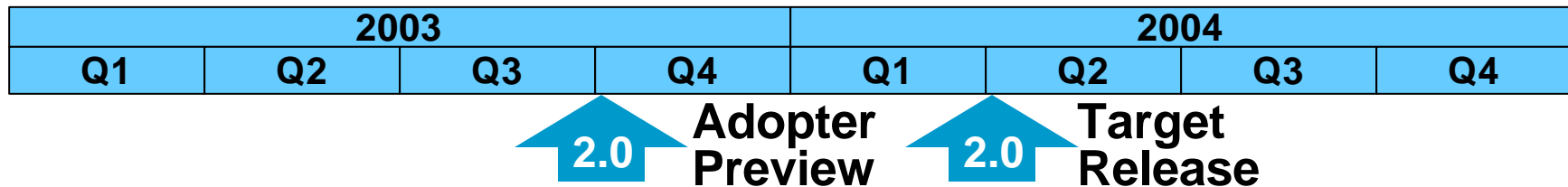
IPMI v1.5 Architecture



IPMI Messages

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IPMI v2.0 Roadmap



IPMI v1.5 Today

- **Monitoring** (temp, volt, fan, etc.)
- **Control** (power on/off/cycle, reset, diag. interrupt)
- **System Event Logging**
- **FRU & SDR Information**
- **Watchdog Timer**
- **Serial and LAN access**
- **Serial and LAN alerts**
- **Platform Event Filtering**
- **Serial Port sharing**
- **Internal/ext'l mgmt busses**

v2.0 Proposed Additions

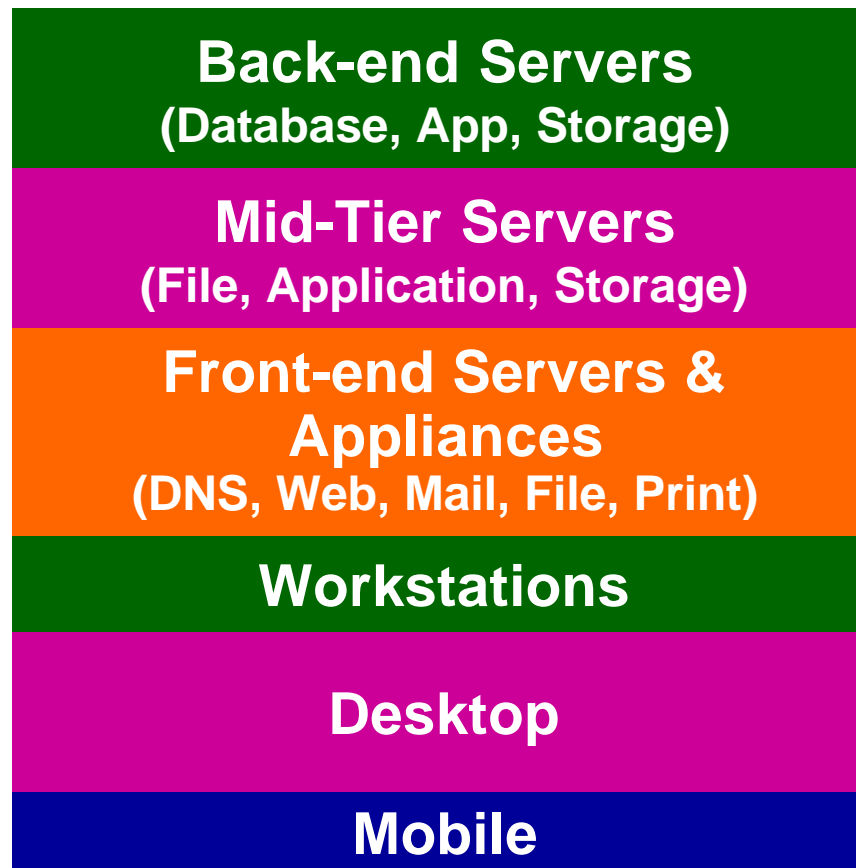
- **Serial redirection over LAN**
- **Terminal mode extensions** (improved 'CLI')
- **Alignment with ASF Authentication**
- **Encryption support**
- **Modular (blade) support**
- **IPMI over Web** (may be post 2.0)

**IPMI continues to evolve
valuable new capabilities**

ASF/IPMI Typical Applications



ASF 2.0

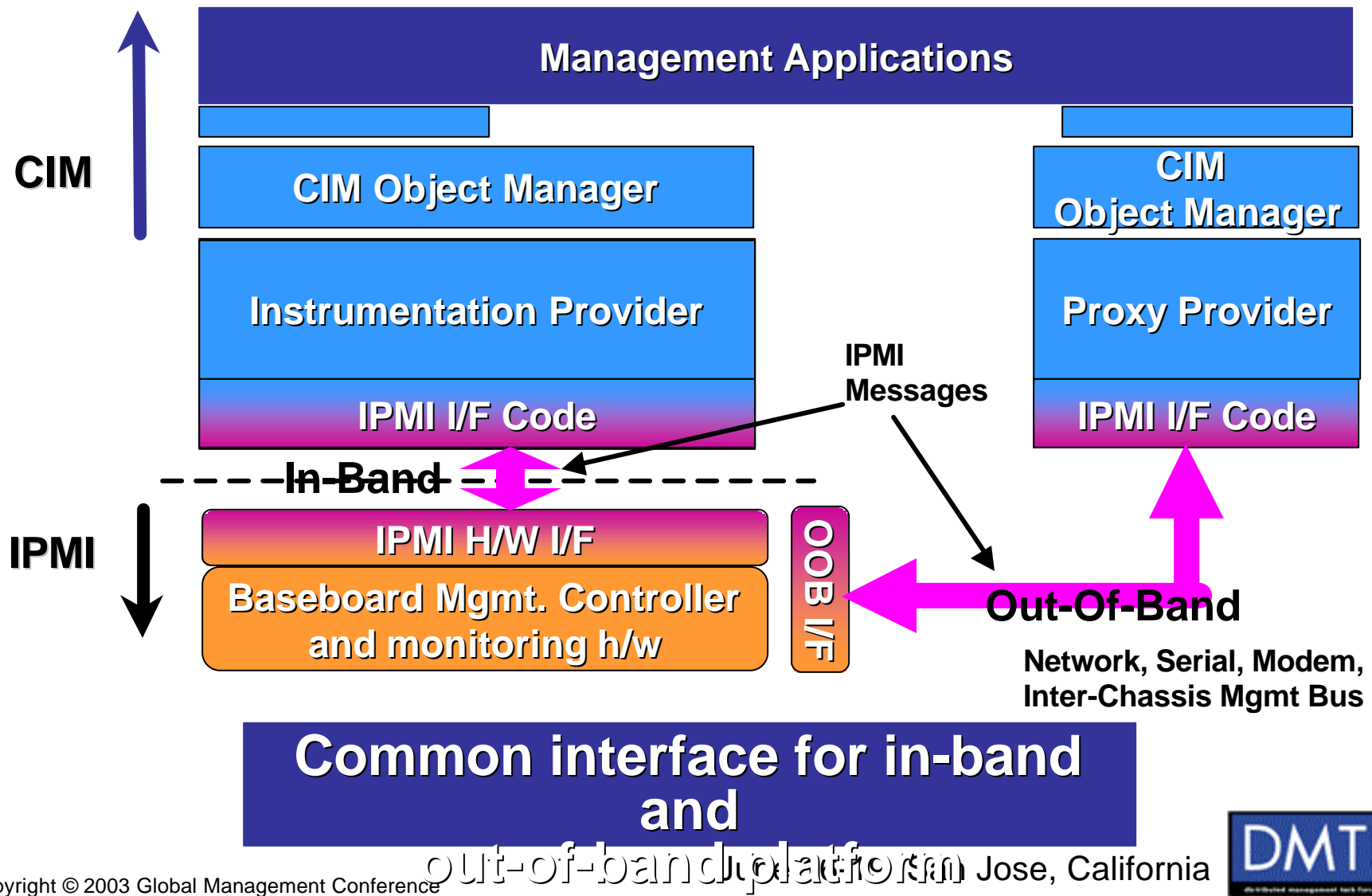


IPMI 1.5

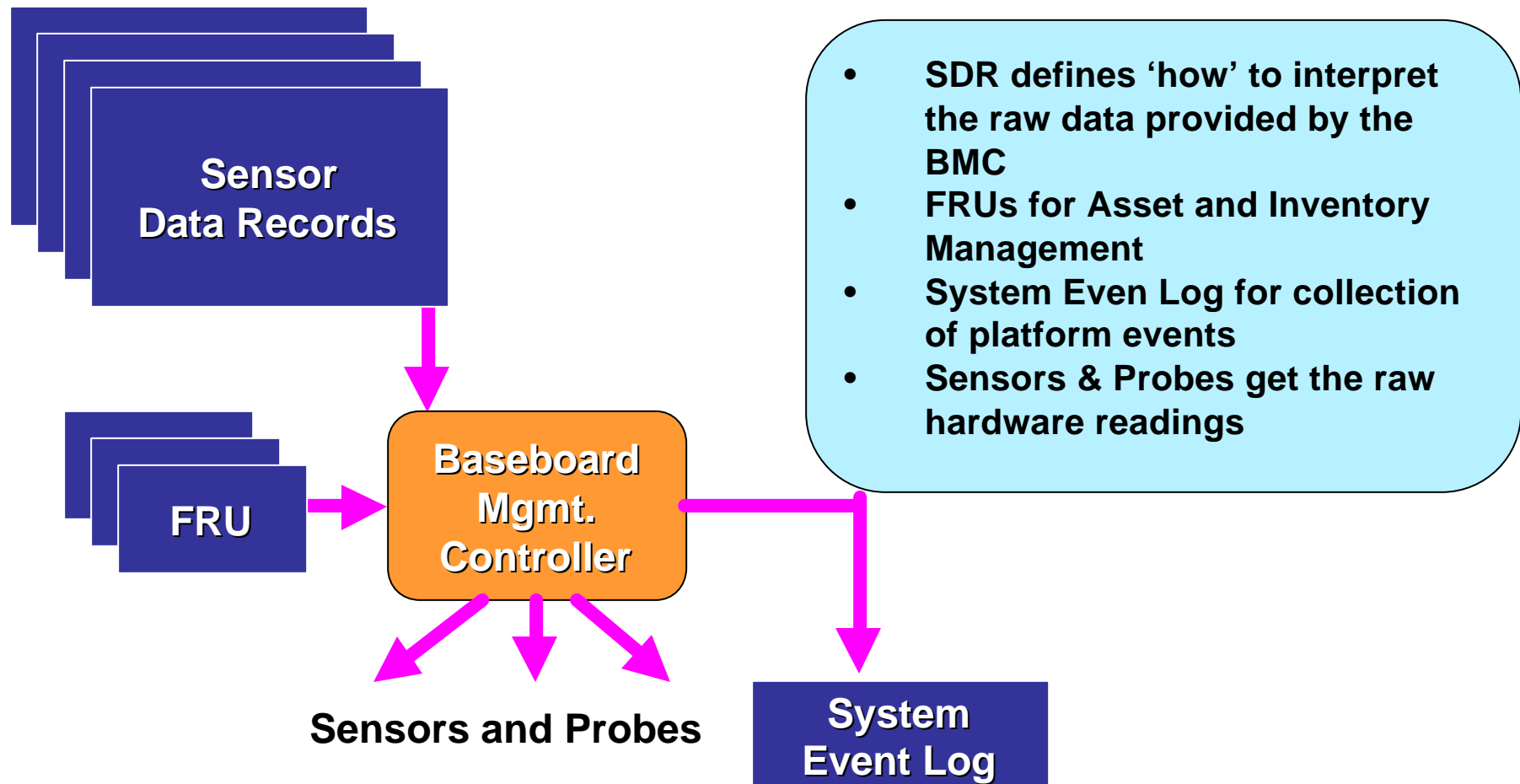


**IPMI and ASF are complementary
and cooperating technologies**

IPMI and CIM

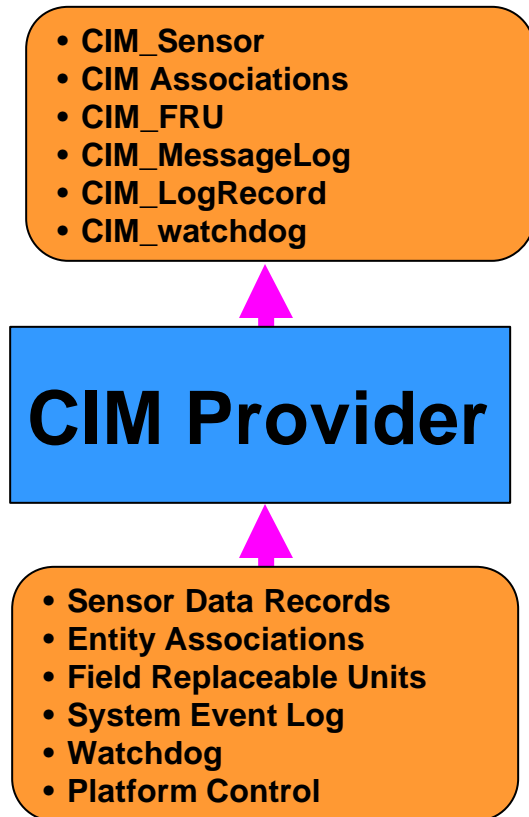


IPMI SW components



sensor description can change independent of sensor access.
Facilitates customization, H/W and F/W reuse.

IPMI mapping to CIM



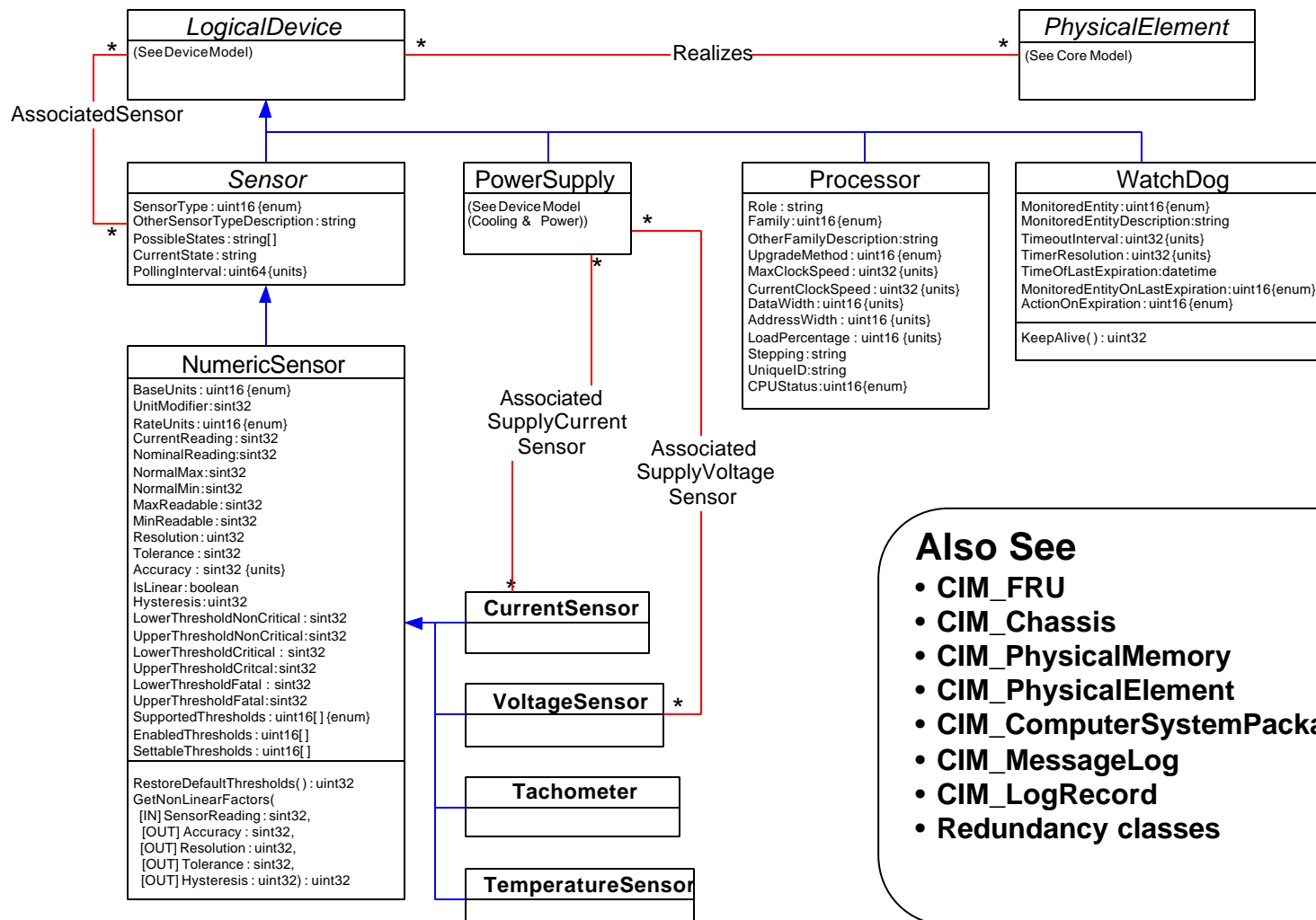
- Map IPMI domain to CIM domain
- No attempt to expose IPMI constructs in CIM
- CIM application is unaware of IPMI
- Self describing hardware interfaces make IPMI CIM provider hardware agnostic

CIM is the interface for management

applications

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Sensors & Devices



IPMI provides comprehensive data to populate

Implementing Discrete/Digital Sensors

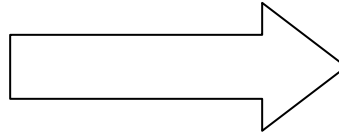
SDR (Type 01/02)

Sensor Number
EntityID
Entity Instance
Sensor Initialization
Sensor Capabilities
Sensor Type
Sensor ID
Event Reading/Type Code
.....



Raw Sensor Access

- Sensor Type information defines the kind of sensor (Temperature, Chassis Intrusion, Fan etc.)
- EntityId allows to associate a Sensor with the Device it is monitoring (CIM_AssociatedSensor)
- Event Reading/Type Code defines PossibleStates



CIM_Sensor

SensorType
OtherSensorTypeDescription
PossibleStates
CurrentState
PollingInterval

IPMI allows straightforward sensor mapping to

Implementing Numeric Sensor

SDR (Type 01/02)

Sensor Number
EntityID
Entity Instance
Sensor Initialization
Sensor Capabilities
Sensor Type
Sensor Units
Sensor Unit _ Base Units
Sensor Unit – Modifier Unit
Linearization
Tolerance
Accuracy
Nominal Reading
Normal MAX, MIN
Sensor MAX, MIN
Sensor ID
Thresholds (Critical, Non-Critical, Non-Recoverable)

+

Raw Sensor Access

units closely mapped

raw reading converted using conversion parameters

thresholds closely mapped

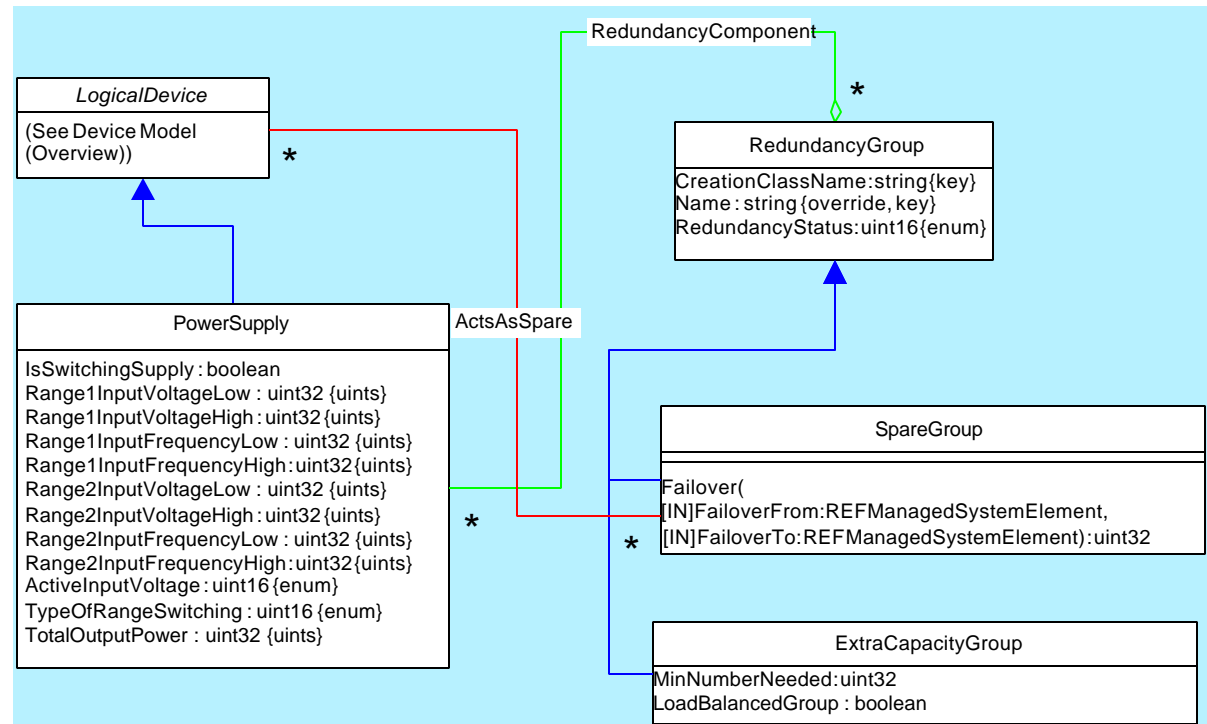
CIM_NumericSensor

SensorType
OtherSensorTypeDescription
PossibleStates
CurrentState
BaseUnits
UnitModifier
RateUnits
CurrentReading
NominalReading
NormalMax
NormalMin
MaxReadable
MinReadable
LowerThresholdNonCritical
UpperThresholdNonCritical
LowerThresholdCritical
UpperThresholdCritical
LowerThresholdFatal
UpperThresholdFatal
SupportedThresholds
EnabledThresholds
SettableThresholds
RestoreDefaultThresholds()

Implementing Associations

SDR (Type 08/09)

Container Entity ID
Container Entity Instance
Contained Entity 1
Contained Entity 1 Instance
Contained Entity 2
Contained Entity 2 Instance



IPMI provides strong support for CIM

associations September 16-19 San Jose, California

More CIM Schema population

| IPMI | CIM |
|---------------------------|---|
| General | Namespace, SystemIdentification, SystemInNamespace, OOBAlertService, ManagementController, DiagnosticTest |
| Physical Characteristics | PhysicalFrame, PhysicalPackage, Chassis, Card, PhysicalConnetor, Slot, PackageInConnetor, ConnectorOnPackage, PhysicalMemory etc. |
| Devices | CoolingDevice, Fan, PowerSupply, Tachometer, AlarmDevice, Processor, Memory, Chassis, |
| Sensors | Voltage, Temperature, Tachometer (FAN speed), Watchdog, ChassisIntrusion |
| Field Replaceable Units | CIM_FRU |
| Platform Event Trap (PET) | CIM Indication (OOB through Proxy) |
| System Event Log (SEL) | MessageLog, LogRecord |
| Power Control | Methods on CIM_System |
| Boot Options | SettingsData (Specific subclassing/enhancements in works) |

The list is only a sample, and not intended to be exhaustive

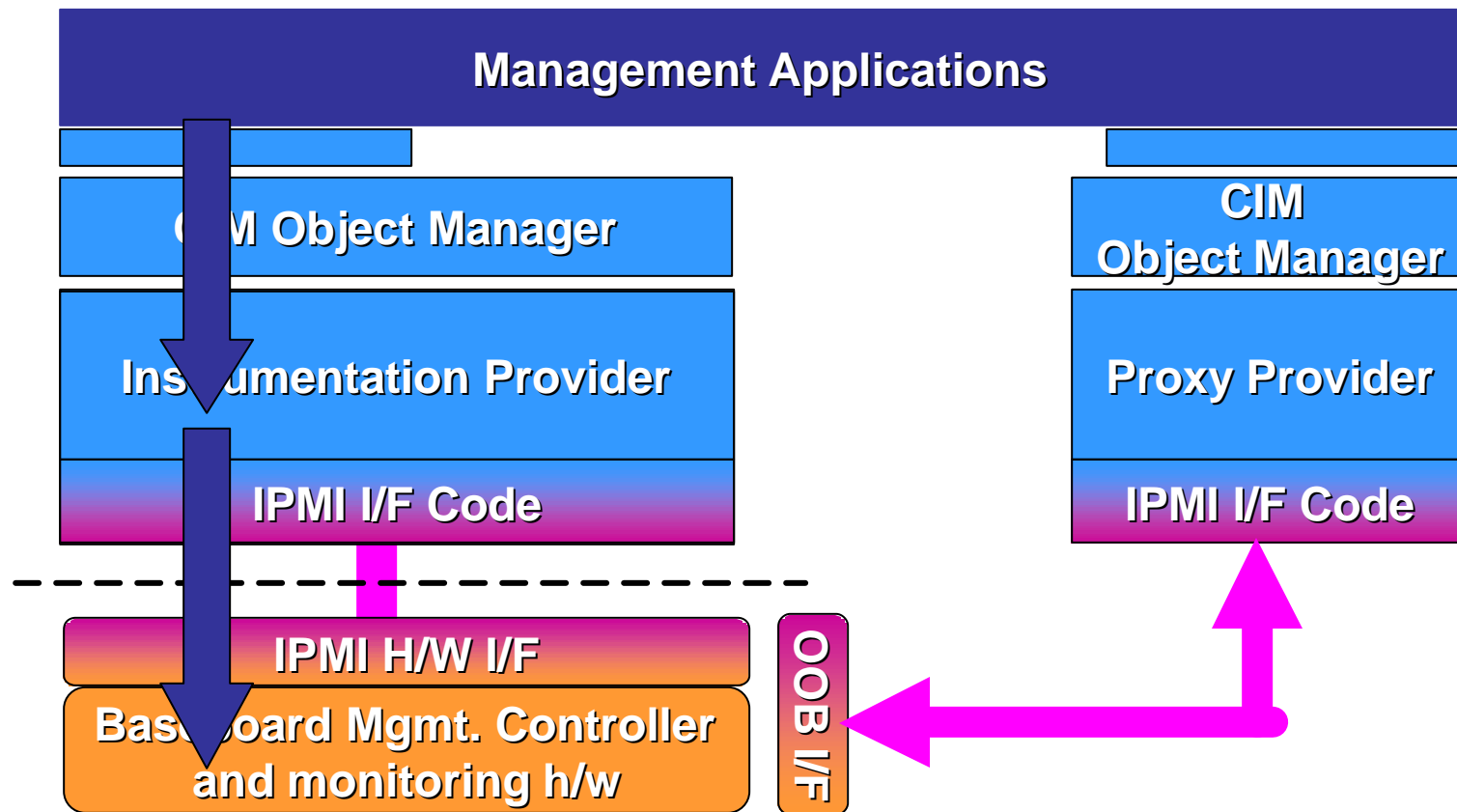
IPMI comprehends a major portion of System &

Devices model

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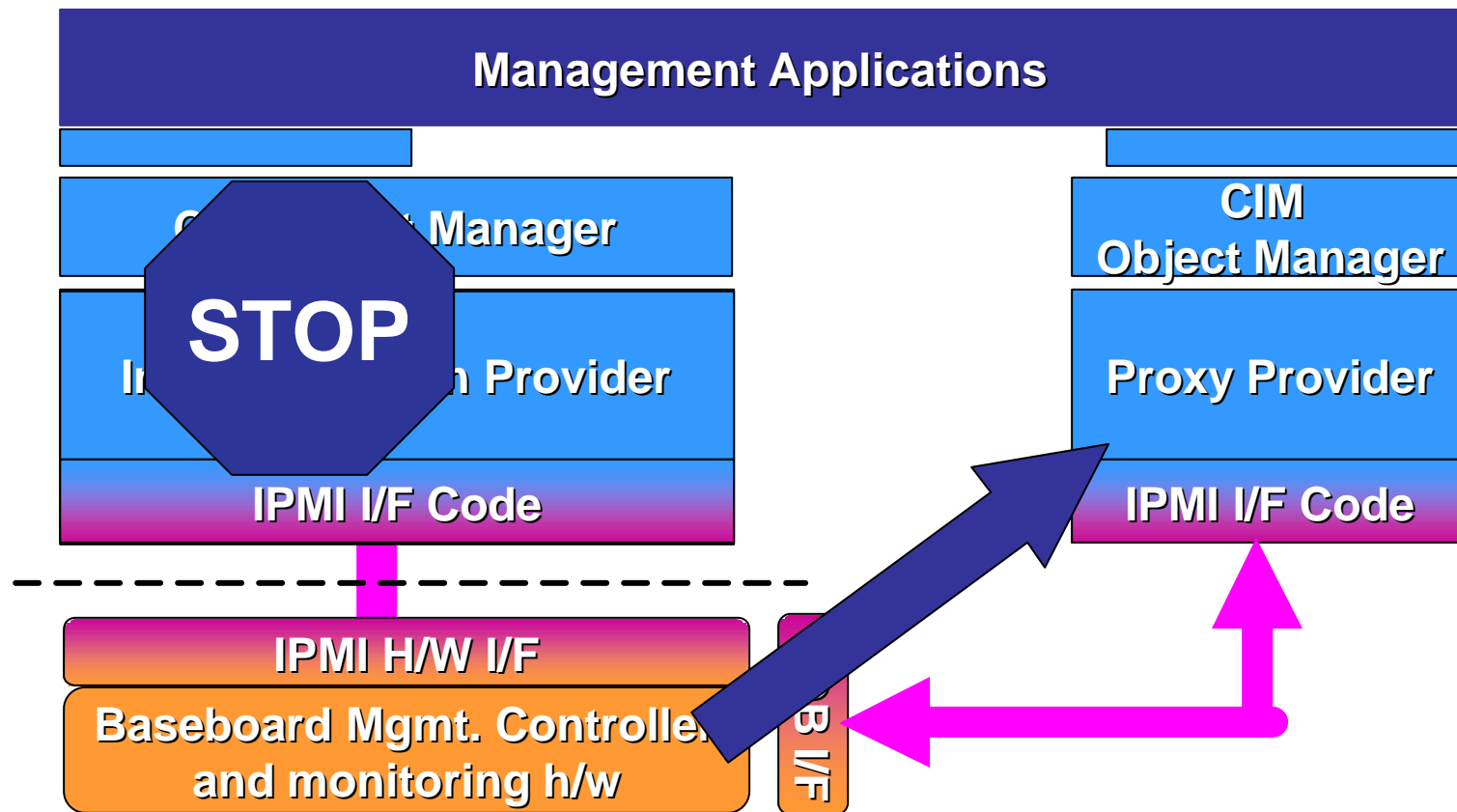


Example Scenario



1. Setup Watchdog, BMC starts

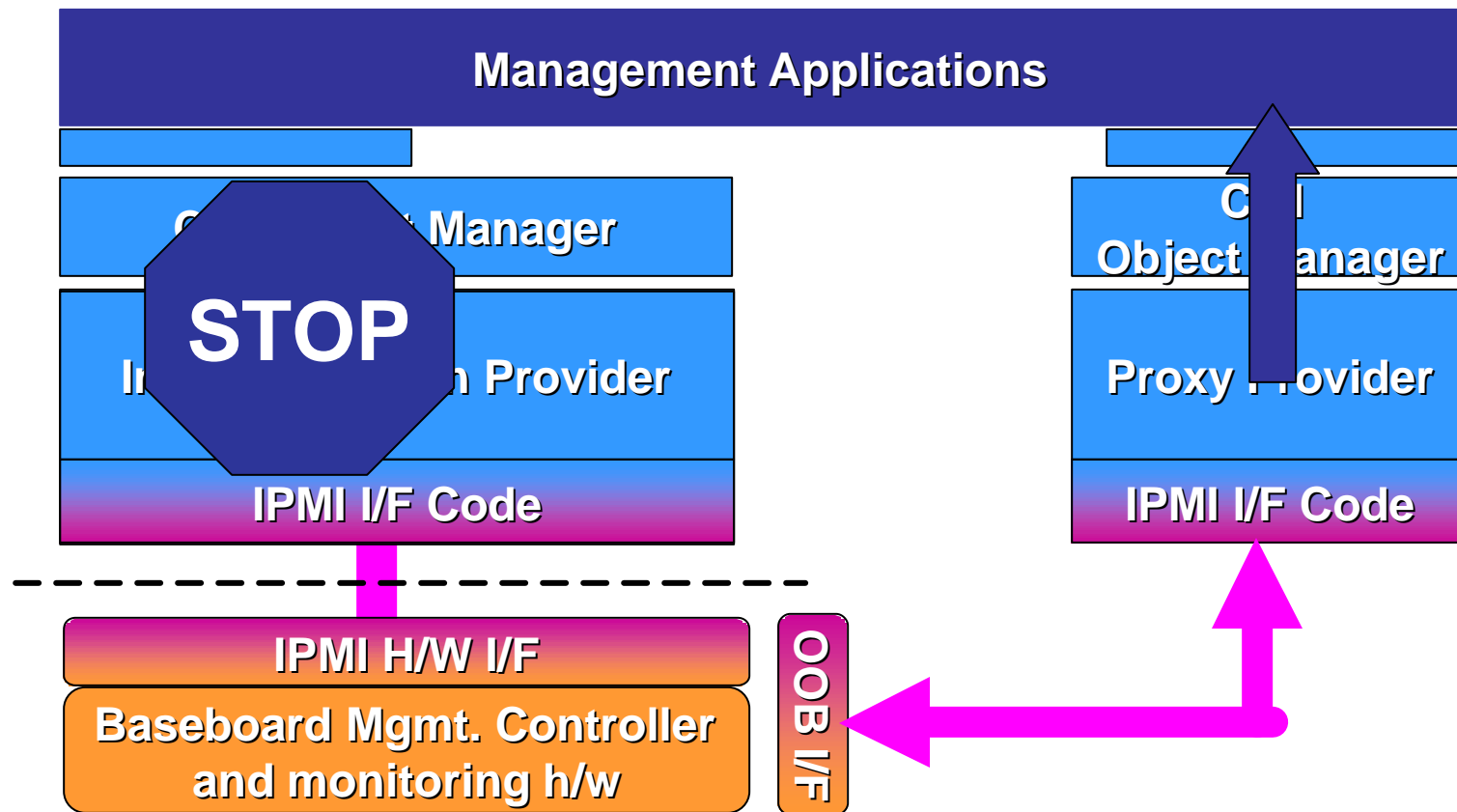
Example Scenario



2. OS Fails, BMC sends a Platform

Event Trap

Example Scenario

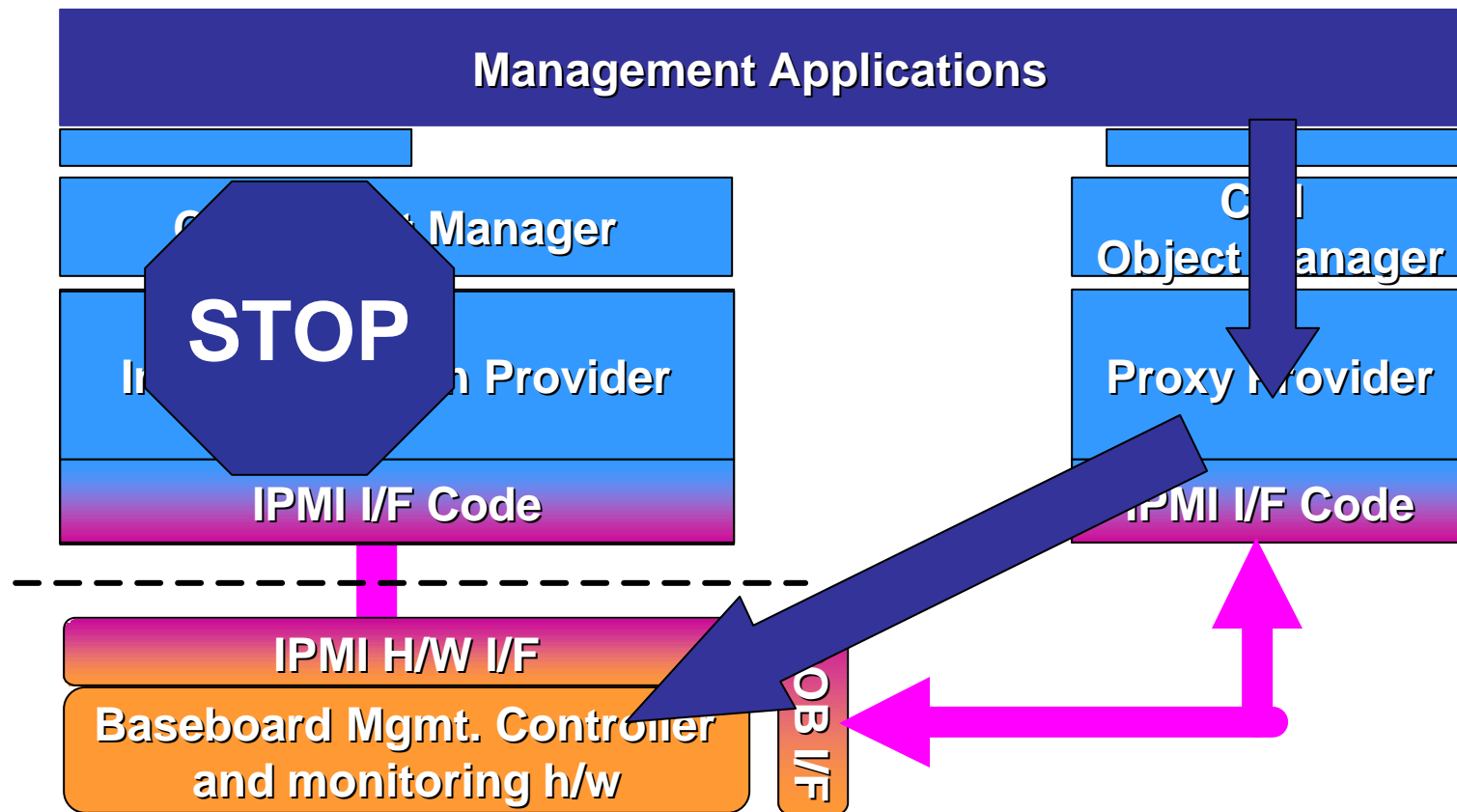


3. Proxy Provider converts PET into a

CIM Indication

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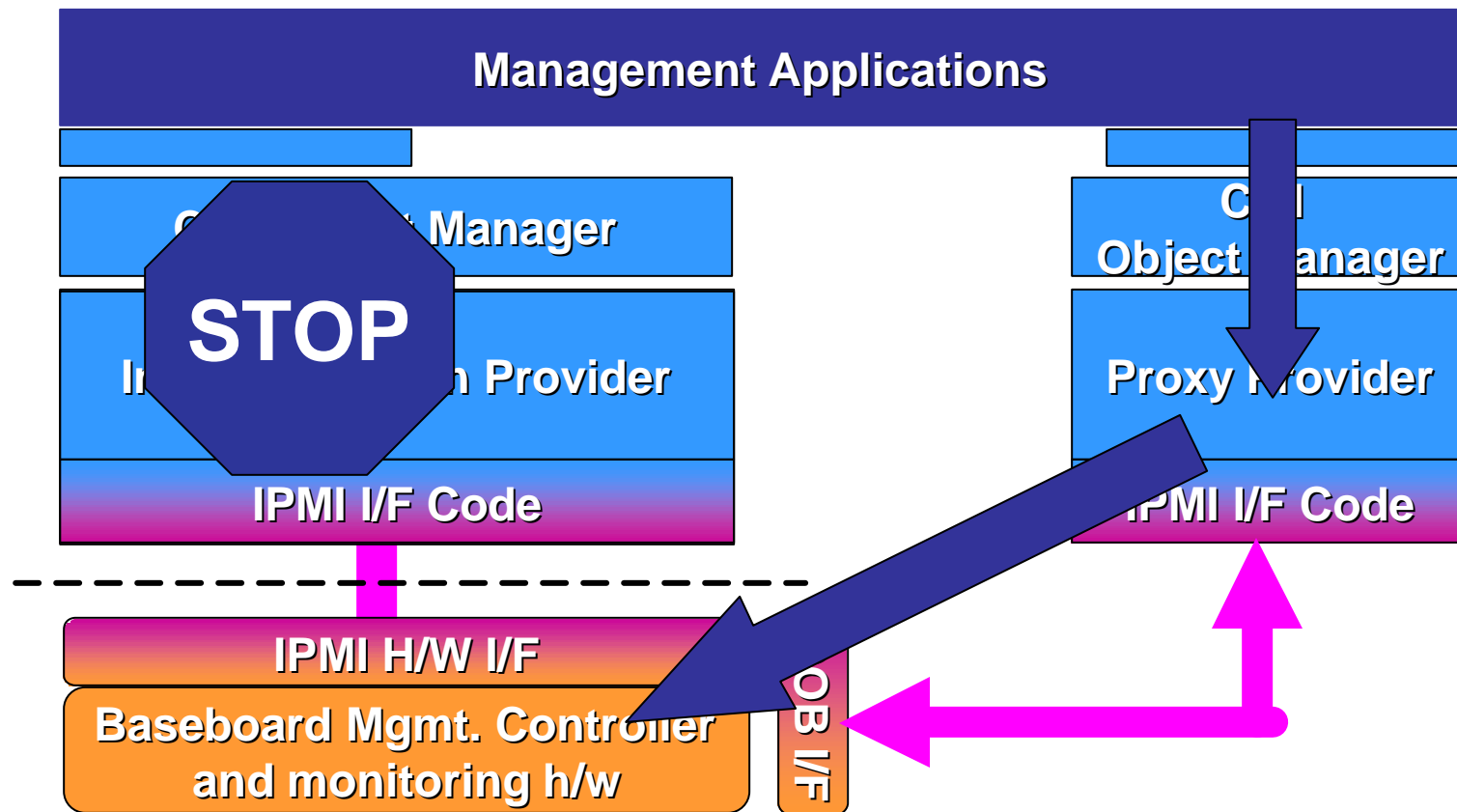
Example Scenario



4. Boot the system to a Diagnostic

Partition

Example Scenario

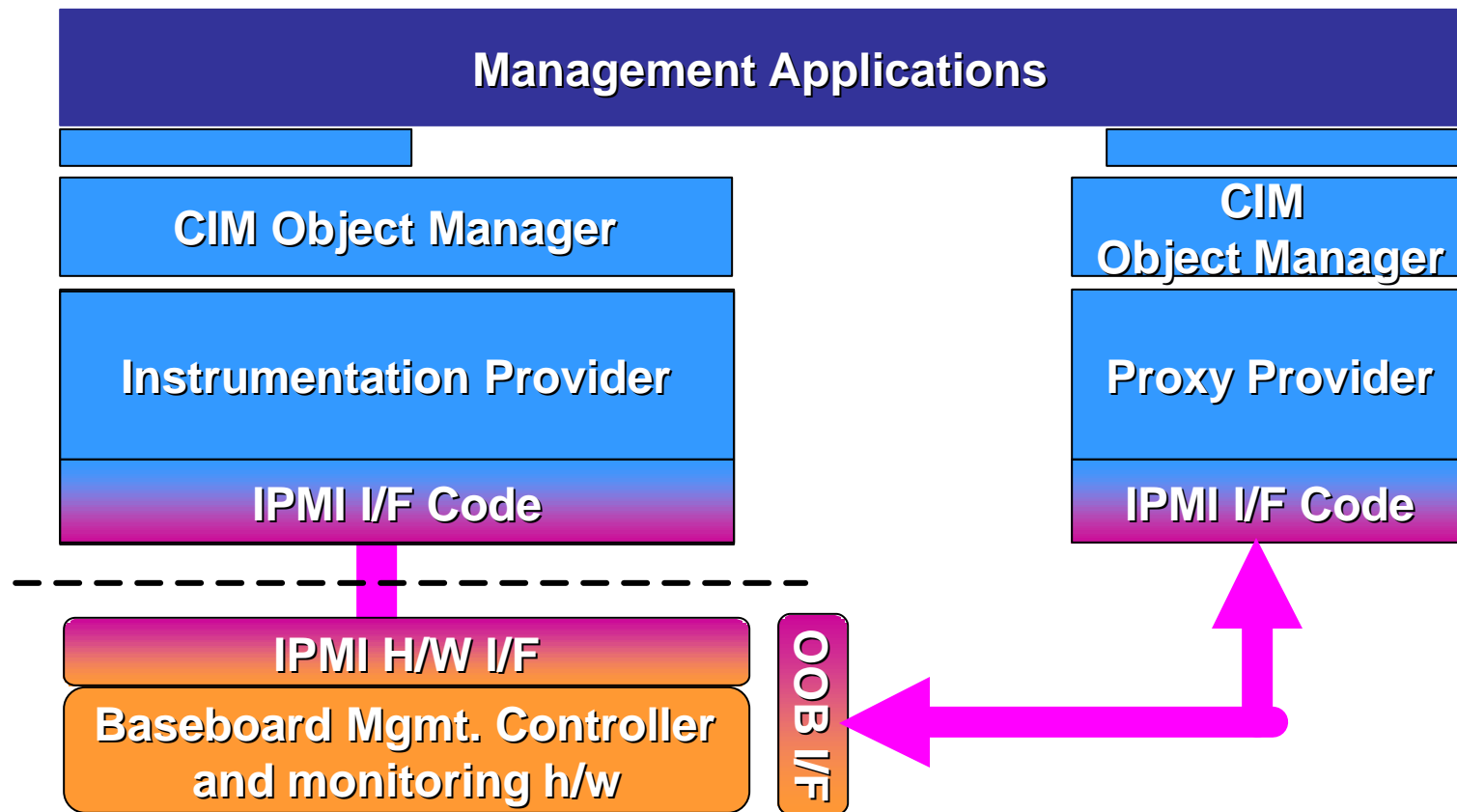


5. Damaged Disk Partition Recovered,

Reboot OS

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Example Scenario



6. OS/Application back up on-line

Summary

- IPMI is the foundation for powerful platform management
- CIM/WBEM is a powerful management model and interface to applications
- IPMI and CIM/WBEM together provide standards based comprehensive management solution for enterprise platforms

Glossary

| | |
|-------------|---|
| BMC | Baseboard Management Controller (an IPMI Controller on Baseboard) |
| FRU | Field Replaceable Unit. A field replaceable component such as a board, module, fan, power supply, etc. |
| ICMB | Intelligent Chassis Management Bus. The ICMB provides a dedicated management bus that enables delivering IPMI messages and alerts between multiple host and peripheral chassis. |
| IPMB | Intelligent Platform Management Bus. Name for the architecture, protocol, and implementation of a special bus that interconnects the baseboard and chassis electronics and provides a communications media for system platform management information. |
| IPMI | Intelligent Platform Management Interface. IPMI defines a common, abstracted, and self-descriptive interface for platform management hardware that monitors server characteristics such as temperature, voltage, fans, power supplies, and chassis. |
| OOB | Out-of-Band. System platform management access that does not involve going through the OS or other software running on the main processors of the managed system. |
| PEF | Platform Event Filtering. A feature in IPMI that enables the BMC to generate a selectable action (e.g. power on/off, reset, send Alert, etc.) when a configurable event occurs on the management system. |
| SDR | Sensor Data Record. SDRs provide the information that tells management software what sensors, events, management controllers, and FRU information is available from a given IPMI implementation. |
| SEL | System Event Log. A non-volatile storage area and associated interfaces for storing system platform event information for later retrieval. |

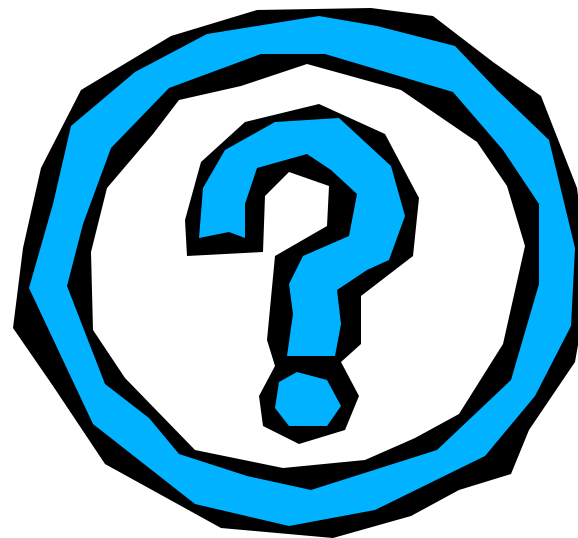
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Arvind.Kumar@intel.com

Tom.Slaight@intel.com

Questions?



For Further Information

<http://developer.intel.com/design/servers/IPMI>

<http://www.dmtf.org>

Backup

Platform Management Technologies

| | | |
|---|-----------------------------------|--|
| <div> <div>IPMI 1.5</div> <div>ASF 2.0</div> </div> | System Health and Security Alerts | <ul style="list-style-type: none"> • Health Alerts (Temperature, Voltage, Fan, etc. 128 definable alerts) • Security Alerts (Chassis Intrusion, LAN Heartbeat, System PWD Violation) • BIOS Messages and Alerts • OS Hung Watchdog Timer |
| | Authenticated Remote Control | <ul style="list-style-type: none"> • Processor Missing (startup Watchdog) • Power up/down/cycle/reset with Boot and Boot Path Options |
| | Status Info | <ul style="list-style-type: none"> • System State • System ASF Capabilities • Presence Ping/Pong (managed system discovery) |
| | Monitoring | <ul style="list-style-type: none"> • Abstracted Local and Remote Monitoring • Health Sensor Present Readings (temperature, voltage, fan, etc.) |
| | Inventory and Logging | <ul style="list-style-type: none"> • FRU/Asset Inventory Data Access • System Event Logging |
| | Extended Out-of-Band Access | <ul style="list-style-type: none"> • Serial/Modem Access • Text-based Access • Inter-chassis Access • Multi-user and multi-level Security for remote access |
| | Extended Alerting | <ul style="list-style-type: none"> • Alerts to multiple destinations • Alerts and Paging via Modem |
| | Automatic Actions | <ul style="list-style-type: none"> • Platform Event Filtering (PEF) - configurable, event-based automatic recovery and alerts |
| | Scalability / Extensibility | <ul style="list-style-type: none"> • Utilizes Independent BMC • "Unlimited" Events and Sensors • Extensible Sensor/Event Busses |